

Serial No. 10/562,824

KAS-5122

Amendment

Responsive to Office Action dated March 29, 2007

Amendments to the Drawings

The attached three sheets of drawings includes changes to FIG. 2B, 4B and 5.

These three sheets, which include FIGS. 2A-2D and 3; FIGS. 4A-4D; and FIGS. 5 and 6 replace the original sheets including FIGS. 2A-2D and 3; FIGS. 4A-4D; and FIGS. 5 and 6.

In FIGS. 2B and 4B, previously omitted reference sign 300 has been added.

In FIG. 5, the reference signs 201, 202, 210, 211, 213, 220 and 230 have been deleted.

Attachments: 3 Replacement Sheets

3 Annotated Sheets showing changes

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REMARKS**Pending Claims**

Claims 1 and 3-12 are pending. Claim 2 has been canceled without prejudice or disclaimer. Claims 1 and 3-6 have been amended. New claims 7 – 12 have been added. No new matter has been added.

Title of the Invention

The correct Title of the Invention is HEATING RESISTOR TYPE FLUID FLOW RATE MEASURING APPARATUS AND CONTROL APPARATUS FOR INTERNAL COMBUSTION ENGINE HAVING THE MEASURING APPARATUS.

Drawings

Figures 2B and 4B have been corrected to include the reference sign "300". The reference signs 201, 202, 210, 211, 213, 220 and 230 have been deleted from Figure 5 to correct the drawings in accordance with the Examiner's requirements.

Claim Rejections Under 35 U.S.C. §112

Claim 2 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention. Applicants have amended claim 1 and canceled claim 2 without prejudice or disclaimer, thereby overcoming the rejection.

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Claim Rejections Under 35 U.S.C. §103

Claims 1-6 are rejected under 35 U.S.C. §103(a) as being unpatentable over one having ordinary skill in the art.

The present invention relates to a heating resistor type fluid flow rate measuring apparatus using a heating resistor for measuring the flow rate of fluid, such as air, in an internal combustion engine. In particular, the present invention is directed to overcoming the problem of water, which adheres to the surface of the heating resistor, having impurities mixed therein which remain on the surface of the heating resistor after evaporation of the water (after heating of the resistor). The impurities cause deterioration of the heating resistor over time.

An example of water with impurities encountered in certain conditions is salt water, which adheres to the heating resistor. Salt water is generated from melting snow on road surfaces treated with salt and infiltrates the internal combustion engine through the air cleaner. Once the water is evaporated, the salt remains on the surface of the heating resistor. Salt has a deliquescent property such that it absorbs moisture from the atmosphere until it becomes dissolved in the liquid it absorbs. Accordingly, when current is supplied to the heating resistor, the water evaporates and then when the current is cut off, the salt water reforms and remains on the surface of the heating resistor due to surface tension. See the specification, page 3, lines 2-7 from the bottom of the page.

As disclosed by the Applicants, when the ignition key is turned on to supply current to the heating resistor, the salt water adhered to the heating resistor evaporates immediately and the dissolved salt remains on the surface of the heating resistor. This process is repeated many times during conditions encountered by a vehicle where

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snow, ice and melting materials are applied to road surfaces. See page 4, lines 1-10, for example.

The present invention aims to remove the salt water with the dissolved salt that has adhered to the heating resistor by using the air sucked into the internal combustion engine to blow the salt water off of the heating resistor before the heating current is supplied to the heating resistor. This breaks the aforementioned cycle of water evaporation and subsequent deliquescence by removing the dissolved salt with the water when it is blown off of the surface of the heating resistor by the air sucked into the internal combustion engine. In this manner, the problem of adhesion of salt to the heating resistor is overcome. This problem is not recognized by one having ordinary skill in the art, and therefore the solution provided by the present invention is also not recognized.

Applicants disclose that there is a constant time period which elapses before heating current is supplied to the heating resistor. During the constant time period, the air sucked in by the engine rotation is able to blow the water containing impurities off of the surface of the heating resistor before the evaporation of the salt water takes place as a result of heating. This aspect of the claimed invention is not obvious to one having ordinary skill in the art. That is, the Examiner has merely suggested that a delay occurs from the time that an ignition key is turned on until the starter starts to turn the motor, and that this is a sufficient disclosure to render the invention as claimed obvious to one having ordinary skill in the art. However, the mere existence of delay in such engine control does not provide a teaching that is sufficient to one having ordinary skill in the art to render the claimed invention obvious under 35 U.S.C. §103. Accordingly, the rejection should be withdrawn.

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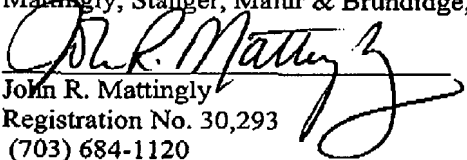
Applicants have added new claims 7-12 that are supported by the Specification. See page 12, lines 14-21 which describes step S4 shown in Figure 1. In particular, Figure step S4 shows that a constant time period elapses after the start of the engine cranking, which is executed at the time when an instruction or a signal for the cranking is generated, or when the actual rotation of the engine has been detected. The example given of the constant time period is 1 second; and claims 7-9 set forth one second as the claimed constant time period. Claims 10-12 set forth that the air flow rate measuring apparatus supplies the heating current to the heating resistor after sucked air blows on the heating resistor, which is not obvious from the art of record. None of the references of record disclose supplying the heating current to the heating resistor after sucked air blows on the heating resistor; or suggest delay of the heating by the constant time period of one second after the start of engine cranking, as claimed by applicants. Accordingly, each of claims 7-12 should also be found to be allowable over the art of record.

Conclusion

In view of the foregoing, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

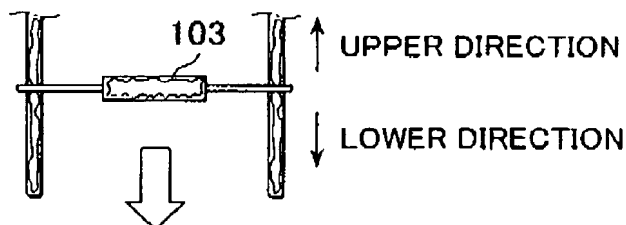
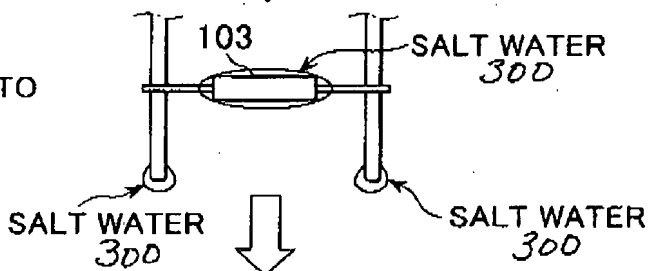
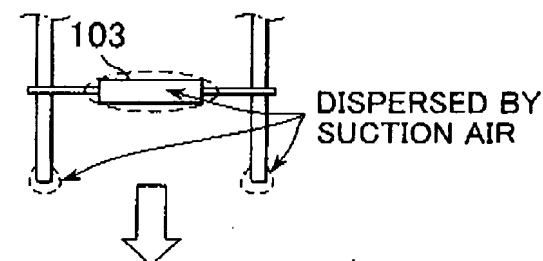
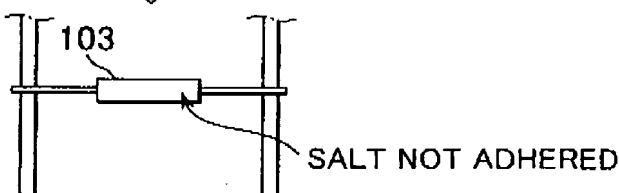
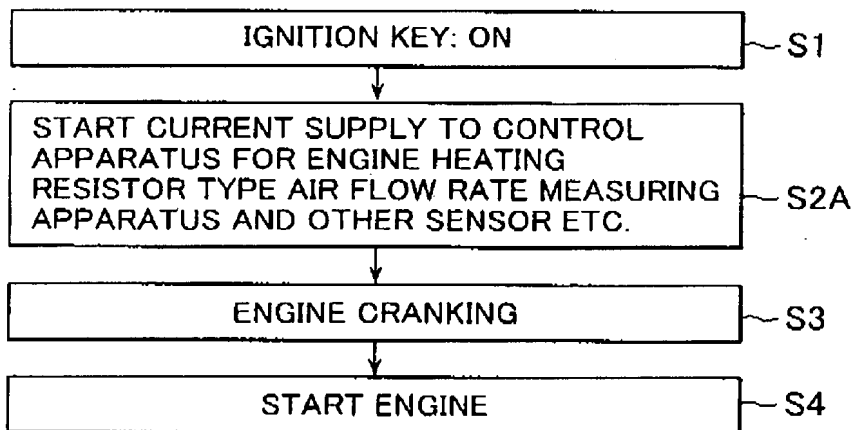
Respectfully submitted,

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Date: October 1, 2007

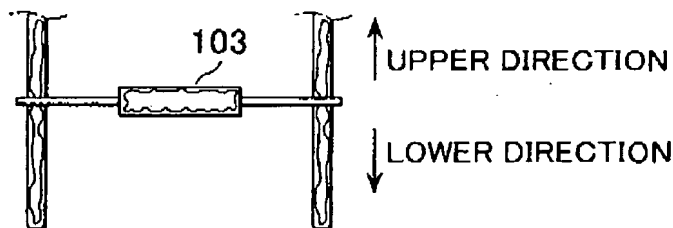
Annotated Marked Up Drawings

FIG. 2AIMMEDIATELY AFTER
SUCKING SALT WATER**FIG. 2B**CHANGE SALT INTO
SALT WATER BY
DELIQUESCENT**FIG. 2C**IMMEDIATELY AFTER
AIR SUCTION BY
CRANKING ETC.**FIG. 2D**CURRENT SUPPLY TO
HEATING RESISTOR**FIG. 3**

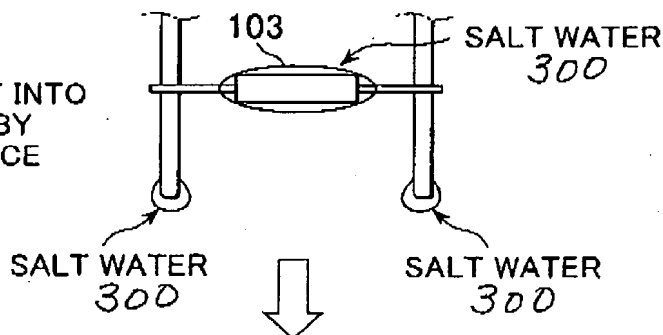
Annotated Marked Up Drawings

FIG. 4A

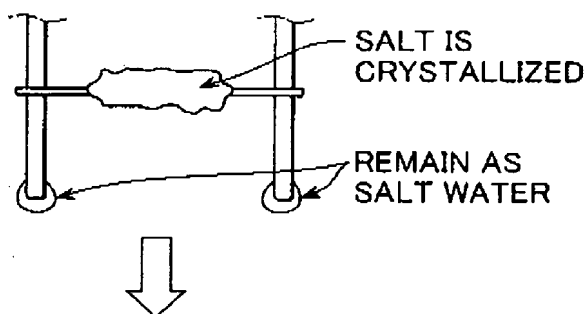
IMMEDIATELY
AFTER SUCKING
SALT WATER

**FIG. 4B**

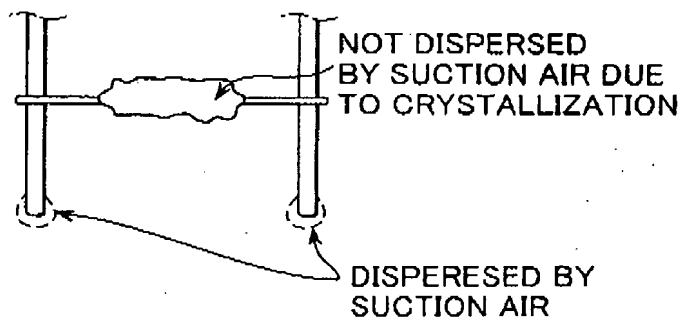
CHANGE SALT INTO
SALT WATER BY
DELIQUESCENT

**FIG. 4C**

CURRENT SUPPLY
TO HEATING
RESISTOR

**FIG. 4D**

IMMEDIATELY
AFTER AIR
SUCTION BY
CRANKING ETC.



Annotated Marked Up Drawings

FIG. 5

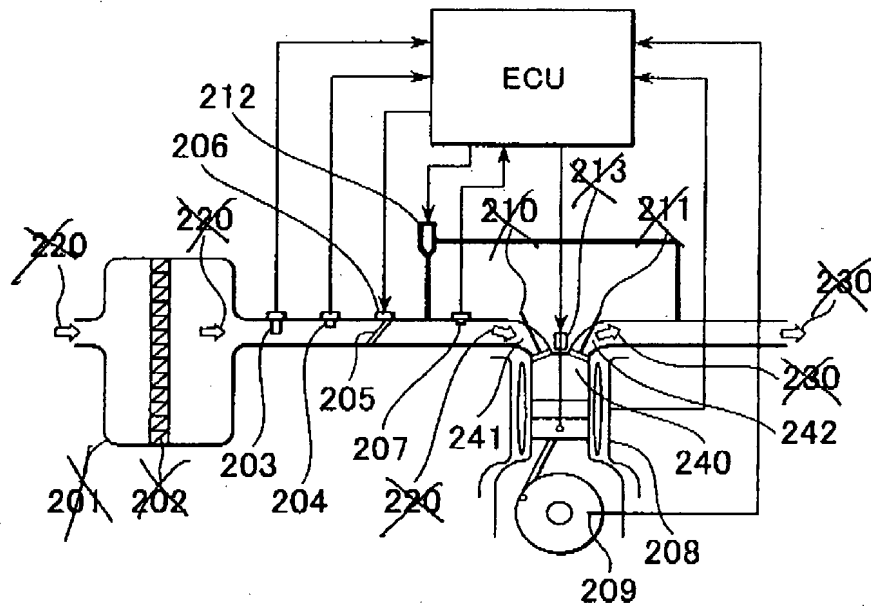


FIG. 6

